

Numerical Simulation of Photochemical pollutants in Extended Phoenix Area

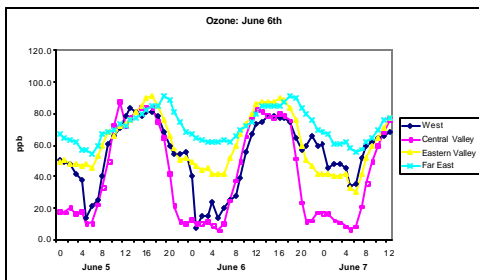
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Outline

- Ozone Episode
- Numerical Models
- Preliminary qualitative result of MM5

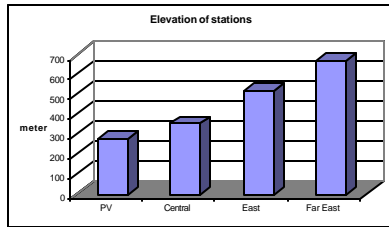
Episodes: June 6th



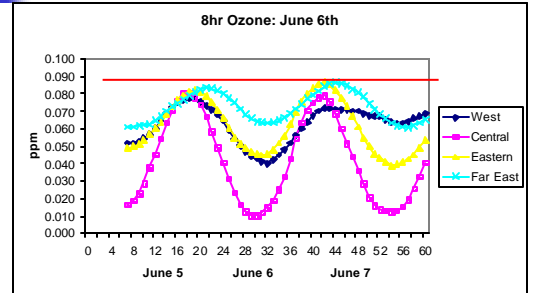
Observation

- West
Palo Verde, (Hillside)
- Central Valley
Surprise, Glendale, Maryvale, Phx Supersite
North Phx, South Phx, Central Phx, South Scottsdale
Tempe
- Eastern Valley
Mesa, Pinnacle Peak, Fountain Hill, Blue Point Bridge
Rio Verde
- Far East
Queens Valley, Tonto

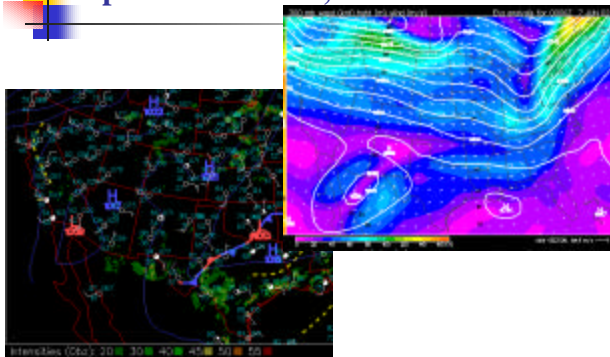
Observation



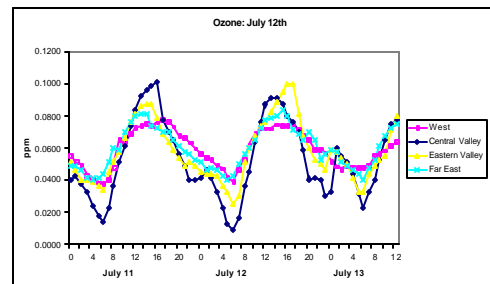
Episodes: June 6th



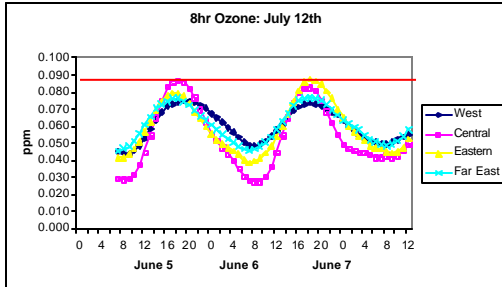
Episodes: June 6th, 2002



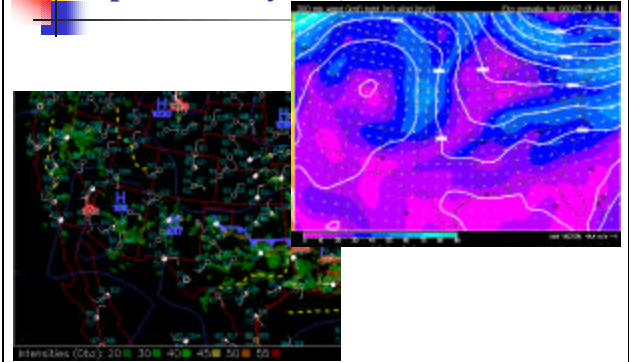
Episodes: July 12th



Episodes: July 12th



Episodes: July 12th, 2002



Models-3/CMAQ (Community Multi-scale Air Quality)

Meteorology

One-Atmosphere
(from Regional to Urban scale)

Emission

- ❖ Chemical reactions
- ❖ Advection & Diffusion
- ❖ Aerosol dynamics & chemistries
- ❖ Clouds effects
- ❖ Plume-in-Grid
- ❖ Dry/Wet depositions

The Fifth-generation Penn State/NCAR Mesoscale Model (MM5)

- Terrain following σ - coordinate
- Non-hydrostatic dynamics
- Four-dimensional data assimilation
- Multiple nest capability
- Physics

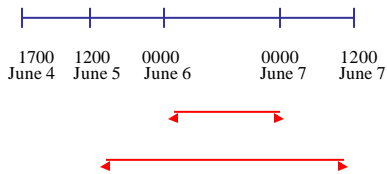


Design of Numerical Simulation

> Study Case: 19 hrs of spin-up for MM5

→ 1700 LST June 4 – 1700 LST June 7, 2002

→ 1700 LST July 10 – 1700 LST July 13, 2002



Design of Numerical Simulation

> Spatial Dimension

- 4 nested domains: 54 km → 18 km → 6 km → 2 km
- 27 vertical layers

> Meteorological data

- IV & BV : NCEP Eta Analysis 40 km output

> Emission data

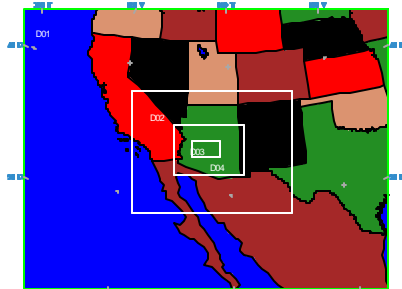
- Outer domain: WRAP'96 Inventory and/or
- ASU'96 Inventory
- Inner domain: MAG'99 Inventory: 2km resolution
 - 92X43 in EW and NS, respectively

> Initial & Boundary Value

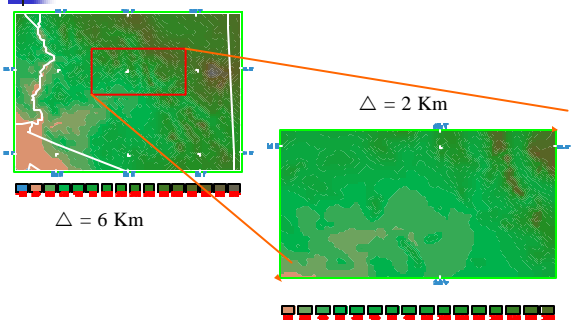
- Profile data taken during '98 Field Exp
- HC canister samples during '98 Field Exp
- Surface monitoring data

Design of Numerical Simulation

Nested Run of MM5: 54 Km → 18 Km → 6 Km → 2 Km



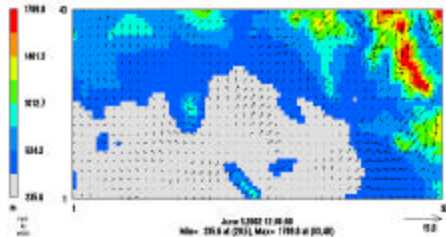
Design of Numerical Simulation



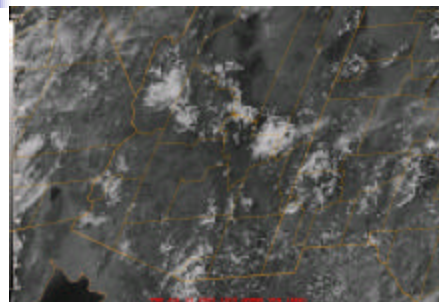
Ground Level Wind Field

1200 LST June 5th – 1200 LST June 7th

Topography & Surface Wind
MM5 Domain



Satellite –Visible channel: July 11th



Satellite –Visible channel: July 12th



Summary & Status

1. Preliminary Result for June case
2. MM5 needs to be tuned for convective case
3. CMAQ simulations are going on